

YELLOWSTONE RIVER CONSERVATION DISTRICT COUNCIL

CONSERVATION DISTRICT MEMBERS: Carbon, Custer, Dawson, Park, Prairie, Richland, Rosebud, Stillwater, Sweet Grass, Treasure, Yellowstone, McKenzie County North Dakota, RAC Chairman

Meeting Minutes -- January 24, 2008

MSU-Billings College of Business – Room 163

Members Present: Don Youngbauer, Rosebud CD; Paul Gilbert, Sweet Grass CD; Bob Hector, Yellowstone CD; Steve Story, Stillwater CD; Walter Rolf, Custer CD; Will Alexander, Carbon CD; Dave Schwarz, Prairie CD; Tony Barone, Richland CD; Kenny Nemitz, Dawson CD; John Moorhouse, RAC Chairman and Orvin Finsaas, McKenzie ND, CD.

Others Present: Warren Kellogg, NRCS/TAC; Burt Williams, TNC/TAC; Robert Lubbers, YRF; Laurie Zeller, DNRC; Jim Robinson, DNRC/TAC; Greg Johnson, COE; Kayla Eckert Uptmor, Roger Kay, Laurel Kozimor, Joel Knofczynski, USACE-Omaha; Mike Penfold, YRF; Clayton Jordan, BOR; Liz Ching, Baucus Office, Rachel Court Tester Office; Susan Gilbertz, MSU-Billings; Gay Easton, Yellowstone CD; Greg Kudray, MTNHP; Ken Frazer, MT FWP; Ken Sambor, Northern Great Plains Joint Venture; LaVerne Ivie, Yellowstone CD; Cheryl Mahnke, Treasure CD; Laurie Kelley, Rosebud CD; Bobbi Vannattan, Rosebud CD; John Pulasky, Our Montana Inc, Nicole McClain, YRCDC Coordinator; Kelly Norwood, Project Assistant and Carol Watts, Custer CD Administrator.

Chairman Don Youngbauer called the meeting to order at 10:05 am on Thursday, January 24, 2008. Introductions were made.

Army Corps of Engineers: Greg Johnson, Project Manager for the ACOE, reported that the TAC had a successful meeting on 1/23/08. He mentioned they were working with the Bureau of Reclamation (BOR) on projects including Intake Diversion Dam. In reference to the 2007 Water Resource Development Act (WRDA), Greg said there were a number of provisions in the act that related to the Yellowstone River and the State of Montana. Section 3110 authorizes ecosystem restoration and recreation projects throughout the Yellowstone Basin. Proposed implementation guidelines are being drafted now. Greg Johnson talked about possible projects and sponsors and how they would be submitted. Greg introduce Kayla Eckert Uptmor, Chief, Planning Branch, Planning, Programs, & Project Management Division for the Army Corps of Engineers. Kayla said the modeling would be set with something that is already in place in order to keep it simple. Greg reminded the Council that WRDA only authorizes the project, it does not fund it. Section 3110 is a permission slip to spend the money, but thus far there isn't any money appropriated.

Greg said that the ACOE now has authority to utilize the Missouri River Recovery program funding and resources to help implement the fish passage project at Intake. An Environmental Impact Statement (EIS) will be written this spring on the Intake Diversion Dam. The YRCDC will be informed and invited to participate.

The ACOE FFY09 President's budget will be out in 2 weeks. In FY08, the ACOE received \$313,000 for the Yellowstone River Corridor Comprehensive Study. Warren's TAC report reflects the recommended itemized ACOE budget for the FY08 funding.

Kayla Eckert Uptmor addressed the Council saying that she was happy that she has been assigned to the Omaha district, and was excited about working with the Council. She sees her role as a public servant and thinks we will see big change in the process through watershed level collaboration. She felt the YRCDC was ahead of the curve in that respect.

RAC Update: Mike Penfold presented a project for the RAC. He stated that demands on the river are increasing, and that stakeholders need to understand where they fit into the picture, and how to sustain our economy, our businesses and our lifestyles. The Council has produced some very useful products and he felt that the RAC should be commissioned to come up with a pilot program for outreach and education. The Yellowstone River Forum would like to work with the RAC in doing this. Warren Kellogg said the TAC strongly supports what Mike Penfold is recommending (see attached TAC notes).

John Moorhouse, Chairman of the RAC commented that the RAC could act as a steering committee for the proposal but that they do not have the skills that would be needed to develop the program. John Moorhouse felt that an expert would need to be hired. Paul Gilbert made a motion to charge the RAC as a committee to develop an outreach and education plan. Walter Rolf seconded, and the motion carried by voice vote. The RAC will report at the next meeting on what they see as the depth and width of the program. Kenny Nemitz urged caution, saying that the ideas presented should be the final ones so we will not be changing plans in the future. Mike Penfold said two approaches could be taken. The first would identify products and how to use them the second would concentrate on issues concerning uses of the river. Don Youngbauer would like to see an inventory of ideas.

TAC Update: Warren Kellogg asked for action to be taken concerning the revised wetlands scope of work. Two options are included in the scope of work: 1) complete only what is absolutely needed to encompass wetlands into the CES, or 2) do full wetland mapping provided other entities pay for the difference in cost. If adopted, the TAC recommends that a letter is written to possible partners if they would like to see Option 2 completed. Tony Barone made a motion to approve the wetlands scope of work as written, and to write letters to the 3 wetland entities. Bob Hector seconded and the motion carried by voice vote. Letters of request for funding will be written to BLM, FWP and the Northern Plains Joint Venture. Warren also made it clear that the Wetland Inventory Mapping cannot be used for any regulatory or jurisdictional means. It does not have the detail that is required for regulatory purposes.

Warren Kellogg informed the Council that the NRCS CIG grant announcement is out and applications are due February 20, 2008. Two possibilities would be to expand the Russian olive demonstrations into other counties and develop innovated fish screens on pumping sites. Nicole reminded the Council that we do have the NFWF grant for Russian olive demonstrations. A motion was made by Paul Gilbert to have Nicole write a grant application to the CIG program for an expanded salt cedar/ Russian olive demonstration project. John Moorhouse seconded. The motion carried by voice vote.

Warren asked for time at the next Council meeting for Karin Boyd to present the final Channel Migration Zone (CMZ) mapping; and also to have Tony Thatcher and Laverne Ivie give a demonstration on the 310 Google web application project.

Floodplain mapping has been completed for Yellowstone County. Stillwater County's draft floodplain mapping will be available in a few weeks. Dawson County is waiting for the USGS bridge survey data and won't be done until the end of 2008.

The Bureau of Reclamation (BOR) will be starting a study on 16 miles of the Big Horn River downstream from Yellowtail Dam studying fishery habitat on side channels as affected by Yellowtail Dam. Warren hopes to work with them to prevent any duplication of work and expense. Walter Rolf commented that the Big Horn River has a big effect on the Yellowstone River. Don Youngbauer granted permission through consensus for the TAC to seek further collaboration with the BOR.

Warren presented the Council with a summary of the GIS work that has been completed, is on going, or is just getting started. The summary also shows funding and status notes.

Funding recommendations proposed by Greg Johnson and the TAC for the 2008 COE money of \$313,000.00 was approved with John Moorhouse making the motion, Walter Rolf seconded and motion carried by voice vote.

Warren informed the Council that the RDG planning grant application submitted to the DNRC by the City of Miles City was turned down. The Council had submitted a letter of support in their behalf. Nicole will call Greg Mills for clarification on why the application was turned down.

Pryor Creek fish passage was discussed with Ken Frazer representing the MT FWP. The TAC recommends that a water availability study be requested by the YRCDC to the Water Resources Division of DNRC. John Moorhouse made the motion that a formal letter be written requesting the DNRC to proceed with the water availability study. Paul Gilbert seconded and the motion carried by voice vote.

Updates: Don Youngbauer reported on the trip to Helena that he took with Nicole McClain and Burt Williams. The reason for the trip was to inform the Governor about how the state grant money had been spent on the Yellowstone CES. Furthermore, they demonstrated the 310 Google web application to the Governor and his staff explaining how the Council is producing useful tools for the residents of the Yellowstone River Basin. There will be many uses for these products such as the LiDAR topographic mapping and the 310 Permit Google web application.

Don Youngbauer said they also talked to Hal Harper and Jim Lynch of the Department of Transportation and Barbara Ranf, Director of Government Affairs of Burlington Northern Santa Fe. At this time, Nicole told the Council that she was working on organizing a rail tour for the Council and the ACOE sometime this spring.

Don Youngbauer reported on the meeting with Rick Duncan, DNRC. Rick told them that concerning watershed groups it takes 10 years of planning and hard work before anything gets done. Don said that shows we are on schedule, and we should be proud of what we have accomplished so far.

Don Youngbauer asked the conservation districts present at the meeting to go back to their districts and come up with a plan for a project to use the 30 million dollars in WRDA.

Don also asked for direction on making a trip to Washington D.C. He feels it is important that the Council continue to stay engaged with our contacts in Washington, DC. He also thought that our appropriations request for FY2009 for \$800,000 could be given to the congressional offices and projects for the 30 million could be outlined. Laurie Zeller said that this expense would be

justified through the pass through grant. Don will check with the MACD group concerning their travel plans. Additionally, MACD appointed Don Youngbauer as their representative to the Council.

Bob Hector reported on an email he received saying that the Montana Conservation Corps had nominated the Yellowstone River Clean-up project for a national award, and it won first place. A presentation will be made in February in Washington DC by Senator John Tester. Bob stated that this is good publicity for the Council and urged each conservation district find a clean up project in their district to do this year. A clip of the car removal project in Hill County was viewed.

Nicole McClain, YRCDC Coordinator reported on plans for a roundtable discussion to be held at a future date. This event is a result of the Council being named in the Water Resources Development Act of 2007, section 3110. Nicole is working on the list of participants, including all of our partners, local watershed groups, and municipalities. The Department of Transportation and the BNSF will also be invited. The roundtable will provide a good forum to report on Council activities, where the study is headed now, and highlight some of the products. The roundtable will also be a good forum for developing a strategic framework for the implementation of WRDA 3110. The location for the roundtable has not been decided. Ideas gained from the roundtable could be used in the new RDGP grant application. Dave Schwarz stated that funding and plans for a roundtable had been written into previous RDGP grant applications, but the efforts were premature at that time. Liz Ching commented that education and outreach was part of the original authorization language.

Nicole requested permission to attend the No Adverse Impact conference being sponsored by the Big Hole Watershed Committee. Paul made a motion for her to attend, Walter seconded, and the motion carried by a 6:4 vote.

Nicole also discussed the 2007 Annual Report and asked the Council to accept the report as final. A motion to accept the report as submitted was made by Dave Schwarz, Steve story seconded, and the motion passed by voice vote.

Nicole also discussed the YRCDC booth at the upcoming MATE show. It was suggested that the Council should have two or three messages at the show, and to keep those messages fairly focused. The booth at the MATE show could also be used to provide general information about the Council, Russian olive, and to have a sign-up sheet for potential new RAC members, or of those wanting more information.

Nicole presented a budget increase request for DNRC and the FY2010/2011 pass-through budget. The increase is for \$20,000, a 20% increase over current funding levels. The justification for the increase is based on increased activity by the Council, the Coordinator, RAC, and TAC, travel expenses, and cost of living increases for staff. Paul Gilbert made a motion to accept the budget increase request, Bob Hector second and the motion passed.

John Moorhouse spoke about the vacancies on the RAC and his recruitment efforts. There was a tele-conference on January 22, and there will be a face-to-face RAC meeting in Billings on February 6, 2008. They will be looking at their purpose, goals and membership makeup and procedures. John will report the results at the next Council meeting. There are nine members on the RAC currently, there are 16 spots on the RAC matrix. John Moorhouse said the upper river is not represented at all.

John Moorhouse reported that the Yellowstone Conservation District wants to do a Russian olive demonstration in their county and he would get more details out about it as they become available. He has also drafted a letter to land managing agencies concerning best management practices. He requested that Council members read it and comment back to him.

Dave Schwarz gave an update on the Missouri River Recovery and Implementation Committee (MRRIC) drafting committee meetings he has attended in the past year or so. During his participation, he requested that tributaries of the Missouri, including the Yellowstone River, be considered in the plans for the recovery of the Missouri River. The MRRIC will provide funding for the Intake project as described in Section 3109 and 5018 of WRDA 2007. Dave said that MRRIC paid some of the expenses in the past but none will be paid in the future. The Council will need to decide whether to stay involved when the time comes.

The congressional update was given by Liz Ching. Liz has given Nicole the form for appropriations request which needs to be submitted by March 7, 2008. Tester and Rehberg's offices need it as well. Liz met with Kayla and Greg of the COE after the TAC meeting and Kayla said that a lot of her job was managing expectations. There are more than two billion dollars in water requests for Montana. The Yellowstone River is fortunate in that it has attracted attention and remains in the vision of many partners and agencies. Liz mentioned that it would be a terrific idea for someone to go to Washington D.C. Talking points including accomplishments and products such as the LiDAR mapping should be highlighted, as well as what is planned for the future.

The name of the Executive Council has been changed to Coordinating Council and the purpose of it is to have a meeting to get the Chairman organized for the meeting. Everyone is welcome to attend. These meeting will be held one and one half hours before the regular Council meeting.

Don thinks the Council should be ready to serve as facilitators for the cities that have requested help with flooding concerns.

Discussion: There was no additional discussion.

Business meeting: Carol Watts presented the financial reports. The financial statement shows all of the activity in the checking account since the last meeting. This report was accepted and filed for audit. No grant statement was submitted at this time. Carol explained that she was meeting with Nicole and Kelly tomorrow to re-format the grant statement and go over totals and that a new revised grant statement would be available at the next meeting.

The December 13, 2007 minutes were approved. John Moorhouse made the motion to accept the minutes, Bob Hector seconded and the motion carried.

MSU – Billings is instating a new policy on room use and in the future, the Council will be charged for holding meetings at this facility. Kelly will research new meeting sites and Nicole will discuss the new policy with David McGinnis and report back at the next meeting.

Public Comment: There was no public comment. The meeting adjourned at 3:35 pm.

Respectfully submitted,

Carol Watts, CCCD Administrator

YRCDC TAC Meeting Notes
Billings, Montana
January 23, 2008

Biology

Wetlands: The draft wetlands scope of work will again be discussed with the Council. There will also be a recommendation to the Council that a letter of request be sent to Ken Sambor (Northern Great Plains Joint Venture), BLM, and the USFWS for assistance in funding the full NWI mapping for the Yellowstone River corridor. Nicole will take the lead in drafting these letters of request. There is also a Montana Land Information Act grant application that is due February 15th that the TAC will recommend the YRCDC apply to for NWI mapping.

Hydrology/Hydraulics/Geomorphology

Hydrology/Hydraulics - Karin Boyd started out our H&H discussion with an outline of the existing Scope tasks. Roger Kay (ACOE) followed up with a PowerPoint presentation providing an up-date on the hydrology work completed by the Omaha ACOE staff to-date. Roger is taking a one year assignment so Joel Knofczynski will be taking over in the interim. See attached memo (2/6/08) from Jim Robinson and Karin Boyd for a full summary of the H&H status.

Draft Bighorn Work Proposal – Some TAC members have sent comments to Ken Frazer regarding the proposed Bighorn River side channel study. The proposal was also discussed at the TAC meeting. It was suggested that representatives from the BOR study team be invited to the next TAC meeting in January to discuss the extent and methodology proposed for their study and how we can best work together to make sure data collected on both the Bighorn and Yellowstone studies will complement one another.

Channel Migration Zone Mapping: Karin Boyd gave an up-date on the progress of the CMZ mapping and distributed draft maps and the report. Comments and suggestions will be forwarded to Karin before the next TAC meeting. An outreach strategy will be drafted by the TAC at their next meeting. There will also be a block of time requested on the Council's April agenda to present the final CMZ mapping and review the draft outreach strategy.

DTM Consulting/Applied Geomorphology Project Summary: Tony Thatcher handed out a project status spreadsheet (1/22/08) for all the work that they have completed, or are in the process of completing, for the YRCDC. They offered to provide periodic updates, at least quarterly, to the TAC from now on.

Information Management/GIS

310 Web Application: Tony Thatcher (DTM Consulting) gave an up-date on progress being made on the 310 web application project. A request will be made to formally present this prototype to the Council at their April meeting.

Projects

Pryor Creek Fish Passage: The Regional FW&P office responded to a request from the YRCDC to summarize fisheries benefits that would be gained from a fish passage project on Pryor Creek. Their conclusions were that the fishery value of Pryor Creek would increase, especially for spawning catfish, if they were allowed to migrate up Pryor Creek. However, they further state that other higher profile projects such as Carterville Diversion and Huntley Dam may be a better use of limited funds at this time. It was suggested that the Council might want Nicole to submit a request for Pryor Creek under Section 3110 WRDA this year. This request is due by March 7th. The TAC will also make a recommendation to the Council that YRCDC request a water availability study be completed by DNRC-Water Resources Division to further investigate the cost/benefits of investing time and money into the fish passage projects. The BIA and Crow Tribe should also be contacted to determine their interest in the fish passage issue.

Budgets/Administrative

ACOE FFY 2008 Budget Recommendations: The following ACOE budget allocation for FFY 2008 was jointly developed by the TAC and ACOE. This recommendation will be taken to the Council for their approval.

Total: \$313K

- Fisheries Scope (2nd Year): 70K
- ACOE Project Mgmt: 70K
- Hydrology and Hydraulics
 - * Hydrology 83K
 - * Yellowstone County (low flow hydrology - pilot project) 15K
 - * Hydraulics 50K
- Quality Assurance (Lidar Mapping) 20K
- Tribal Consultation 5K

DNRC Line Item Budget: Nicole reviewed the proposed SFY 2010-11 budget request and justification. The request includes an annual budget increase from 100K to 120K. She plans to review the proposed budget with the Council at their meeting tomorrow.

2007 Annual Report: Nicole reported that the 2007 YRCDC Annual Report has been completed and distributed.

Grant Up-Dates

2005 RDG Grant: The original 2005 RDG budget and scope are being revised to reflect a partial redirection of the remaining funds. Nicole will be sending a letter of request to Rick Duncan (DNRC) for a modification of the existing contract.

Conservation Innovation Grant: Nicole reviewed a recent grant announcement for the national CIG administered by NRCS. There is up to 20 million dollars available for innovated natural resource and technology projects. Russian olive management demonstration projects and fish passage options were discussed. Applications are due Feb. 20th.

2009 RDG Grant Application: Nicole will be working on a 2009 RDG application that will be due May 15th. Nicole will ask the Council to form a Council/RAC/TAC grant committee to assist with the RDG application. Burt Williams and Jim Robinson “volunteered” to be on the committee representing the TAC.

Public Outreach

Yellowstone River Roundtable – 2008: Nicole briefly reviewed a proposal that will be taken to the YRCDC regarding a Yellowstone River Roundtable tentatively scheduled for this coming April. This roundtable would be a meeting of basin watershed groups, organizations, local government, and state/federal agencies to discuss potential restoration projects in the Yellowstone River Basin and identify common resource issues to collaborate on.

Outreach and Education Plan: Mike Penfold discussed a proposal to develop an outreach and education program. This program would be developed in cooperation with the RAC, TAC and the Forum. There have been a substantial amount of information and data generated from the CES effort; the time is right to begin sharing it with the public interested in the Yellowstone River. The TAC expressed strong support for the proposal and suggested that it could replace the current Public Participation Scope of Work in the Project Management Plan which is little more than a placeholder. If it was adopted as a Scope of Work under the PMP, ACOE funding could be used for implementation. Mike will be introducing this proposal to the Council.

TAC Membership

The TAC again discussed potential replacements for Scott Rickard on the TAC. This person would take the lead on revising and overseeing the economics scope of work. John Moorhouse has recommended a BLM economist who is located in the Billings BLM office. Other possible candidates will be contacted before the next TAC meeting to determine their interest and availability.

Next TAC Meeting

The next Yellowstone River TAC meeting is scheduled for April 15th and 16th.

Attachment to 1/23/08 TAC Meeting Notes

February 14, 2008

MEMO

TO: YRCDC TAC

FROM: Jim Robinson, TAC
Karin Boyd, TAC

RE: H&H Status and Prototype Output for Yellowstone River CEA

Background

The overall goal of the hydrology scope of work is to determine the ecologically sustainable hydrologic condition of the Yellowstone River and compare that condition to the existing condition. Hydrology is a foundational element of the technical work plan because so much of the ecology and productivity of the system is determined by its hydrology – the amount and timing of water flowing through the system. Hydrologic variation plays a major role in structuring the biotic diversity within river ecosystems such as the Yellowstone as it controls key habitat conditions within the river channel, the floodplain, and the hyporheic

zones. Other scopes of work within the Cumulative Effects Assessment Scope of Work are documenting the status of the biology and human community within the corridor (fisheries, avian, riparian, socioeconomic).

Examination of historic aerial photography has led us to suspect that water resources development may be the single most significant cumulative effect in the Basin. That is why so much effort (\$) is being expended toward the hydrology component of the work plan. It is a significant effort to develop the HEC-HMS (Hydrologic Engineering Center – Hydrologic Modeling System) model and convince ourselves of its reliability and accuracy. Once we are convinced, we can use it to test hypothetical alternatives and management scenarios such as additional basin storage, change in existing reservoir operation and changes in irrigation demand. We can also use it to determine changes in the natural (un-regulated) versus the developed (regulated) hydrology, and to predict response to different climate scenarios (e.g., extended droughts).

Another critical result from the HEC-HMS is input to the HEC-RAS (Hydrologic Engineering Center – River Analysis System), also known as the hydraulic model. This is the model that combines flow information with the LiDAR-derived digital terrain information to predict water surface elevation for a given flow at a given point along the river. The work is directed primarily at establishing 100- and 500-year floodplain boundaries, but also is scoped to provide hydraulic results for more frequent recurrence intervals, including river stages, velocities, flow depths, and flooded areas. Of particular interest to cumulative effects assessment and restoration planning is the frequency of side-channel inundation and how that frequency may have changed over time. In addition, the hydraulic work plan is scoped to examine the effect of man-made floodplain features (e.g., Glendive I-90 Bridge), so that the combined effects of floodplain structures and water development may be examined in a cumulative effects context.

Current H&H Status

The H&H (hydrology and hydraulic) work for the Yellowstone River CEA is being conducted by specialists from the U.S. Army Corps of Engineers, Omaha District. Work on the project began in 2004 with the signing of the cost-share agreement for the project and has proceeded incrementally starting with the upper portions of the Basin. Omaha District personnel (Roger Kay, Joel Knofczynski, and Laurel ?) met with the TAC during its January 23, 2008 meeting in Billings to communicate project status and level of effort expected for this year.

The hydrology budget allocation for federal fiscal year 2008 is \$98,000 (see TAC meeting notes for ACOE FFY08 allocation). Prior year hydrology budget allocations are shown in Table 1. Currently, the HMS model is complete for the basin above the Big Horn confluence. Hundred-year flood flows necessary for regulatory floodplain delineation have been developed for Yellowstone and Stillwater Counties. Work on the model is 50 percent complete for the Big Horn portion of the Yellowstone Basin and is anticipated to be complete during FFY 2008 (September 30, 2008). Roger is taking a one-year assignment; Joel will be taking over model development for Roger in the interim. A HEC-HMS beta version 3.2 is being used with limited success. Because so much of the Yellowstone Basin is at high elevation, a newly developed snowpack melting module is being employed.

Table 1: Yellowstone Annual H&H Spending *

	<u>Hydrology</u>	<u>Hydraulics</u>
2004 -	\$60K (FEMA)	
2005 -	\$22K	
2006 -		\$130K (includes 50K -brdg survey)
2007 -	\$60K	\$ 60K ?
2008 -	\$98K	\$50K

TOTAL ???

???

* These figures are based upon agreed-upon allocations (YRCDC TAC meeting notes) and need to be reviewed by the ACOE for accuracy.

Work on the hydraulic modeling has been directed primarily toward production of regulatory floodplain maps. Table 1 shows annual spending on the hydraulic work. High-growth counties that have contributed grant funding toward the LiDAR terrain mapping are priority. Yellowstone County is complete and is awaiting publication by FEMA as part of a county-wide floodplain mapping product. A preliminary map has been produced by the Corps for Stillwater County and is undergoing in-house technical review; submittal to FEMA for review is anticipated later this spring. Dawson County floodplain mapping will begin later this year, including analysis of ice jamb effects and re-establishment of a secondary channel (chute) that was cutoff by construction of the I-90 bridge approach in the 1960s.

Hydrology and Hydraulics Output Request

As part of Work Order No. 4 of the GIS Services Contract, a CEA database framework (river atlas) is being developed and populated on a pilot basis. The purpose of the atlas is to provide a repository for information generated by the various components of the CEA in a format that facilitates interdisciplinary examination and spatial analysis.

At the January 23, 2008 TAC meeting it was agreed that prototype data and map products could and should be generated for those portions of the project area where the models (HMS and RAS) and terrain data were ready. The following is a list of H&H output that we would like to see produced in a pilot test hydrology and hydraulic analysis of the Yellowstone River. We have selected three reaches that vary based on their channel type, extent of floodplain encroachment, and extent of armor. All show significant change in geomorphology from 1950-2001. All have bathymetric and LIDAR coverage and hence will be conducive to low-flow analysis.

Three reaches located upstream of the Bighorn River confluence depict a range of geomorphic conditions and types of impacts. These reaches are listed in Table 1 and a map of each reach is attached.

Table 1. Reaches requested for hydrology and hydraulic analysis

<i>Reach</i>	<i>RM</i>	<i>Length (mi)</i>	<i>Location</i>	<i>Type</i>	<i>Pct Armor</i>	<i>Pct Dike</i>	<i>Pct Trans Encroach</i>	<i>Comment</i>
A17	385.7-390.3	4.6	Upstream Laurel	Unconfined Anabranching	8%	6%	0%	Extensive split flow; significant reduction in RCI since 1950
B4	352.9-357	4.1	Upstream Huntley	Partially Confined Straight	72%	41%	10%	Loss of floodplain area; heavily armored
B10	309.8-316.8	7	Between Pompey's Pillar and Custer	Partially Confined Meandering	2%	0%	9%	Loss of anabranching channel length through time, yet minimal physical features. Substantial floodplain cutoff by railroad grade

Information Requested for Each Reach

1. Hydrology
 - a. Flood Frequency
 - For Regulated AND Unregulated conditions:
 - 1.5, 2, 5, 10, 25, 50, 100-yr discharges
 - b. Flow Duration
 - For Regulated AND Unregulated Conditions:
 - 5%, 20%, 50%, 75%, and 90% duration flows
 - c. Low Flows
 - 7 day, 10 year low flow (7Q10)

George and Ken – are there other more ecologically significant low flow measures?
2. Hydraulics
 - a. For 7Q10, 1.5, 2.5, 10, 25, 50, and 100-yr discharges: Regulated AND Unregulated
 - Average cross section velocity (mean channel velocity profile)
 - Average shear stress (shear stress profile)
 - Max depth at each cross-section
 - Mean depth at each cross-section
3. Map output
 - a. For each event modeled in (2):
 - Reach-scale maps showing areas of inundation

Data Transfer and Quality Assurance Process

The primary reason for providing tech transfer capabilities is to ensure broad acceptance and veracity of the results. Through the cost-share agreement, Montana has made a significant investment in these work efforts. Transfer of results and information generated by the model development process is necessary to realize the full potential of the investment made in this powerful tool. Considerable effort (\$) has been expended to gather and process input data, including streamflow and other electronic data coverages (e.g., elevation, soils, and precipitation).

As set forth in Appendix “A” of Yellowstone River Project Management Plan (PMP), the hydrology scope of work (see Section 8.0 Channel and Floodplain: Hydrology (11-17-2003)) will develop a HEC-HMS model for the entire Yellowstone River Basin. HEC-HMS is a hydrologic precipitation runoff and routing model developed by the Corps’ Hydrologic Engineering Center. It has been around for years and is a standard tool in the water resources toolbox. Previous TAC discussions have concluded that development of a Corps-sponsored ftp (federal transfer protocol) site to post hydrology and hydraulic data and results is necessary. To date, no provision has been made by the Omaha District for this transfer.

The SOW attached to the PMP contains a provision for development of a Quality Control Plan for both the H&H work plans. For these work efforts, the principal investigators are to develop a Quality Control Plan (QCP) that outlines review procedure for study products and deliverables. The QCP should include a description on the QC process, outline of interim review milestones, names and qualifications of reviewers, and an example of comment/issue resolution. Although considerable progress has been made toward other H&H components, no proposal has been presented for this work component. External technical review possibilities include USGS, DNRC and/or contracted staff.